

JS 44
(Rev. 07/89)

CIVIL COVER SHEET

199-CV-802 LEK/DRH

The JS-44 civil cover sheet and the information contained herein neither replace nor supplement the filing and service of pleadings or other papers as required by law, except as provided by local rules of court. This form, approved by the Judicial Conference of the United States in September 1974, is required for the use of the Clerk of Court for the purpose of initiating the civil docket sheet. (SEE INSTRUCTIONS ON THE REVERSE OF THE FORM.)

I (a) PLAINTIFFS

FORD OXAAL

5/27 copy of complaint
+ docket sent to
Wash., DC (WL)

Albany

(b) COUNTY OF RESIDENCE OF FIRST LISTED PLAINTIFF
(EXCEPT IN U.S. PLAINTIFF CASES)

41851

DEFENDANTS

INTERACTIVE PICTURES CORPORATION;
EASTMAN KODAK COMPANY; NIKON, INC.;
and CENDANT CORPORATION

COUNTY OF RESIDENCE OF FIRST LISTED DEFENDANT
(IN U.S. PLAINTIFF CASES ONLY)

NOTE: IN LAND CONDEMNATION CASES, USE THE LOCATION OF THE TRACT OF LAND INVOLVED

(c) ATTORNEYS (FIRM NAME, ADDRESS, AND TELEPHONE NUMBER)

Daniel M. Sleasman, Esq.
HARRIS BEACH & WILCOX, LLP
20 Corporate Woods Blvd.
Albany, NY 12211 Tele: 518-427-9700

ATTORNEYS (IF KNOWN)

Rule 12 Def 9/14/99 @ 11:30 a.m.

II. BASIS OF JURISDICTION

(PLACE AN X IN ONE BOX ONLY)

- ☐ 1 U.S. Government Plaintiff
- ☒ 3 Federal Question (U.S. Government Not a Party)
- ☐ 2 U.S. Government Defendant
- ☒ 4 Diversity (Indicate Citizenship of Parties in Item III)

III. CITIZENSHIP OF PRINCIPAL PARTIES

(For Diversity Cases Only)

(PLACE AN X IN ONE BOX FOR PLAINTIFF AND ONE BOX FOR DEFENDANT)

- | | | | | | |
|---|---------------------------------------|----------------------------|---|----------------------------|---------------------------------------|
| | PTF | DEF | | PTF | DEF |
| Citizen of This State | <input checked="" type="checkbox"/> 1 | <input type="checkbox"/> 1 | Incorporated or Principal Place of Business in This State | <input type="checkbox"/> 4 | <input type="checkbox"/> 4 |
| Citizen of Another State | <input type="checkbox"/> 2 | <input type="checkbox"/> 2 | Incorporated and Principal Place of Business in Another State | <input type="checkbox"/> 5 | <input checked="" type="checkbox"/> 5 |
| Citizen or Subject of a Foreign Country | <input type="checkbox"/> 3 | <input type="checkbox"/> 3 | Foreign Nation | <input type="checkbox"/> 6 | <input type="checkbox"/> 6 |

IV. CAUSE OF ACTION

(CITE THE U.S. CIVIL STATUTE UNDER WHICH YOU ARE FILING AND WRITE A BRIEF STATEMENT OF CAUSE.)

DO NOT CITE JURISDICTIONAL STATUTES UNLESS DIVERSITY)

35 U.S.C. Sec. 101 et. seq., 271, 281, 283, 284 and 285.
Patent infringement.

99-CV-0802
LEK DRH

V. NATURE OF SUIT (PLACE AN X IN ONE BOX ONLY)

CONTRACT	TORTS		FORFEITURE/PENALTY	BANKRUPTCY	OTHER STATUTES
<input type="checkbox"/> 110 Insurance <input type="checkbox"/> 120 Marine <input type="checkbox"/> 130 Miller Act <input type="checkbox"/> 140 Negotiable Instrument <input type="checkbox"/> 150 Recovery of Overpayment & Enforcement of Judgment <input type="checkbox"/> 151 Medicare Act <input type="checkbox"/> 152 Recovery of Defaulted Student Loans (Excl. Veterans) <input type="checkbox"/> 153 Recovery of Overpayment of Veteran's Benefits <input type="checkbox"/> 160 Stockholders' Suits <input type="checkbox"/> 190 Other Contract <input type="checkbox"/> 195 Contract Product Liability	PERSONAL INJURY <input type="checkbox"/> 310 Airplane <input type="checkbox"/> 315 Airplane Product Liability <input type="checkbox"/> 320 Assault, Libel & Slander <input type="checkbox"/> 330 Federal Employers' Liability <input type="checkbox"/> 340 Marine <input type="checkbox"/> 345 Marine Product Liability <input type="checkbox"/> 350 Motor Vehicle <input type="checkbox"/> 355 Motor Vehicle Product Liability <input type="checkbox"/> 360 Other Personal Injury	PERSONAL INJURY <input type="checkbox"/> 362 Personal Injury—Med Malpractice <input type="checkbox"/> 365 Personal Injury—Product Liability <input type="checkbox"/> 368 Asbestos Personal Injury Product Liability PERSONAL PROPERTY <input type="checkbox"/> 370 Other Fraud <input type="checkbox"/> 371 Truth in Lending <input type="checkbox"/> 380 Other Personal Property Damage <input type="checkbox"/> 385 Property Damage Product Liability	<input type="checkbox"/> 610 Agriculture <input type="checkbox"/> 620 Other Food & Drug <input type="checkbox"/> 625 Drug Related Seizure of Property 21 USC 881 <input type="checkbox"/> 630 Liquor Laws <input type="checkbox"/> 640 R.R. & Truck <input type="checkbox"/> 650 Airline Regs <input type="checkbox"/> 660 Occupational Safety/Health <input type="checkbox"/> 690 Other LABOR <input type="checkbox"/> 710 Fair Labor Standards Act <input type="checkbox"/> 720 Labor/Mgmt. Relations <input type="checkbox"/> 730 Labor/Mgmt. Reporting & Disclosure Act <input type="checkbox"/> 740 Railway Labor Act <input type="checkbox"/> 790 Other Labor Litigation <input type="checkbox"/> 791 Empl. Ret. Inc. Security Act	<input type="checkbox"/> 422 Appeal 28 USC 158 <input type="checkbox"/> 423 Withdrawal 28 USC 157 PROPERTY RIGHTS <input type="checkbox"/> 820 Copyrights <input checked="" type="checkbox"/> 830 Patent <input type="checkbox"/> 840 Trademark SOCIAL SECURITY <input type="checkbox"/> 861 HIA (1395ff) <input type="checkbox"/> 862 Black Lung (923) <input type="checkbox"/> 863 DIWC/DIWW (405(g)) <input type="checkbox"/> 864 SSID Title XVI <input type="checkbox"/> 865 RSI (405(g)) FEDERAL TAX SUITS <input type="checkbox"/> 870 Taxes (U.S. Plaintiff or Defendant) <input type="checkbox"/> 871 IRS—Third Party 26 USC 7609	<input type="checkbox"/> 400 State Reapportionment <input type="checkbox"/> 410 Antitrust <input type="checkbox"/> 430 Banks and Banking <input type="checkbox"/> 450 Commerce/ICC Rates/etc. <input type="checkbox"/> 460 Deportation <input type="checkbox"/> 470 Racketeer Influenced and Corrupt Organizations <input type="checkbox"/> 810 Selective Service <input type="checkbox"/> 850 Securities/Commodities/Exchange <input type="checkbox"/> 875 Customer Challenge 12 USC 3410 <input type="checkbox"/> 891 Agricultural Acts <input type="checkbox"/> 892 Economic Stabilization Act <input type="checkbox"/> 893 Environmental Matters <input type="checkbox"/> 894 Energy Allocation Act <input type="checkbox"/> 895 Freedom of Information Act <input type="checkbox"/> 900 Appeal of Fee Determination Under Equal Access to Justice <input type="checkbox"/> 950 Constitutionality of State Statutes <input type="checkbox"/> 890 Other Statutory Actions
REAL PROPERTY <input type="checkbox"/> 210 Land Condemnation <input type="checkbox"/> 220 Foreclosure <input type="checkbox"/> 230 Rent Lease & Ejectment <input type="checkbox"/> 240 Torts to Land <input type="checkbox"/> 245 Tort Product Liability <input type="checkbox"/> 290 All Other Real Property	CIVIL RIGHTS <input type="checkbox"/> 441 Voting <input type="checkbox"/> 442 Employment <input type="checkbox"/> 443 Housing/Accommodations <input type="checkbox"/> 444 Welfare <input type="checkbox"/> 440 Other Civil Rights	PRISONER PETITIONS <input type="checkbox"/> 510 Motions to Vacate Sentence Habeas Corpus: <input type="checkbox"/> 530 General <input type="checkbox"/> 535 Death Penalty <input type="checkbox"/> 540 Mandamus & Other <input type="checkbox"/> 550 Other			

VI. ORIGIN

(PLACE AN X IN ONE BOX ONLY)

- ☒ 1 Original Proceeding
 ☐ 2 Removed from State Court
 ☐ 3 Remanded from Appellate Court
 ☐ 4 Reinstated or Reopened
 ☐ 5 Transferred from another district (specify)
 ☐ 6 Multidistrict Litigation
 ☐ 7 Appeal to District Judge from Magistrate Judgment

VII. REQUESTED IN COMPLAINT:

CHECK IF THIS IS A CLASS ACTION
☐ UNDER F.R.C.P. 23

DEMAND \$

Check YES only if demanded in complaint:

JURY DEMAND: ☒ YES ☐ NO

VIII. RELATED CASE(S) IF ANY

(See instructions)

JUDGE LEK/DRH

DOCKET NUMBER 98-CV-1684

DATE

SIGNATURE OF ATTORNEY OF RECORD

May 20, 1999

Summons Iss'd.
(wcl)

U. S. DISTRICT COURT
N.D. OF N.Y.
FILED *WZ*

MAY 20 1999

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LAWRENCE K. BAERMAN, CLERK
ALBANY

UNITED STATES DISTRICT COURT
FOR THE NORTHERN DISTRICT OF NEW YORK

FORD OXAAL,

Plaintiff,

v.

INTERACTIVE PICTURES
CORPORATION; EASTMAN
KODAK COMPANY; NIKON, INC.;
AND CENDANT CORPORATION,

Defendants.

Case No.

99-CV-0802

COMPLAINT FOR PATENT
INFRINGEMENT

LEK

DRH

Plaintiff Ford Oxaal brings this Complaint against Defendants Interactive Pictures Corporation, Eastman Kodak Company, Nikon, Inc. and Cendant Corporation and alleges as follows:

JURISDICTION, PARTIES AND VENUE

1. This is a civil action for patent infringement arising under the patent laws of the United States, more specifically, under 35 U.S.C. §§ 101 et. seq., 271, 281, 283, 284 and 285.

2. Jurisdiction for the patent infringement claim is founded on 28 U.S.C. §§ 1331, 1338(a) and 1367.

3. Plaintiff Ford Oxaal ("Mr. Oxaal"), an individual, is a resident of the State of New York. Mr. Oxaal is a leading innovator in the field of full-surround imaging technology and the inventor of significant technological advances in this field.

4. Upon information and belief, Defendant Interactive Pictures Corporation ("IPIX") is a Tennessee corporation with its principal place of business located at 1009 Commerce Park Drive, Oak Ridge, Tennessee 37830. Upon information and belief, IPIX also has a place of business located at 45 Rockefeller Plaza, #2000, New York, New York 10011.

5. Upon information and belief, Defendant Eastman Kodak Company ("Kodak") is a New Jersey corporation with its principal place of business located at 343 State Street, Rochester, New York 14650.

6. Upon information and belief, Defendant Nikon, Inc. ("Nikon") is an affiliate of Nikon Corporation with its principal place of business located at 1300 Walt Whitman Road, Melville, New York 11747-3064.

7. Upon information and belief, Defendant Cendant Corporation ("Cendant") is a Delaware corporation with its principal place of business located at 9 West 57th Street, New York, New York 10019.

8. Venue is proper in this district pursuant to 28 U.S.C. § 1400(b), because of the domicile of Plaintiff and because each of the Defendants, upon information and belief, has committed acts of infringement and/or has a regular and established place of business in this district.

9. Defendants are subject to personal jurisdiction in the State of New York because each Defendant is doing business and/or has caused tortious injury to Mr. Oxaal in the State of New York.

10. Venue is also proper in this district pursuant to 28 U.S.C. § 1391(b) and (c), as each Defendant is deemed to reside in the district where it is subject to personal jurisdiction.

U.S. PATENT NO. 5,903,782

11. Mr. Oxaal is the inventor and owner of U.S. Patent No. 5,903,782 ("the '782 patent") entitled "Method and Apparatus for Producing a Three-Hundred and Sixty Degree Spherical Visual Data Set."

12. An application for the issuance of the '782 patent, was filed on November 14, 1996, and the '782 patent was duly and properly issued on May 11, 1999, by the United States Patent and Trademark Office, a copy of which is attached to this Complaint as Exhibit 1. The '782 patent is now, and has been at all times since its date of issue, valid and enforceable.

CLAIM FOR RELIEF
(Patent Infringement)

13. Mr. Oxaal adopts, alleges and incorporates by reference, as if fully set forth herein, Paragraphs 1 through 12 of this Complaint.

14. Upon information and belief, IPIX is knowingly and willfully engaged in the manufacture, use and/or sale of products that directly infringe one or more claims of the '782 patent, without authority or license from Mr. Oxaal, all in violation of 35 U.S.C. § 271(a).

15. Upon information and belief, Cendant is engaged in the use and/or sale of products that directly infringe one or more claims of the '782 patent, without authority or license from Mr. Oxaal, all in violation of 35 U.S.C. § 271(a).

16. Upon information and belief, Kodak contributorily infringes and induces infringement of one or more of the claims of the '782 patent by selling a camera system package, known as the DC200 Camera with Lens Kit, whose only purpose, when combined with IPIX hardware and/or software products, is to capture back-to-back images in accordance with the patented process claimed in the '782 patent. These actions by Kodak are without authority or license from Mr. Oxaal, and are all in violation of 35 U.S.C. § 271(b)-(c).

17. Upon information and belief, Nikon contributorily infringes and induces infringement of one or more of the claims of the '782 patent by selling camera system packages whose only purpose, when combined with IPIX hardware and/or software products, is to capture back-to-back images in accordance with the patented process claimed in the '782 patent. These actions by Nikon are without authority or license from Mr. Oxaal, and are all in violation of 35 U.S.C. § 271(b)-(c).

18. Upon information and belief, IPIX contributorily infringes and induces infringement of one or more of the claims of the '782 patent by selling camera system packages manufactured by Kodak and/or Nikon whose only purpose, when combined with IPIX software products, is to capture back-to-back images in accordance with the patented process recited in the '782 patent. These actions by IPIX are deliberate and willful, as well as without authority or license from Mr. Oxaal, and are all in violation of 35 U.S.C. § 271(b)-(c).

19. The Defendants are liable to Mr. Oxaal for infringement of the '782 patent.

20. The amount of money damages that Mr. Oxaal has suffered by reason of the acts of infringement by Defendants cannot be determined without an accounting and is therefore subject to proof at trial.

21. This is an exceptional case under the provisions of 35 U.S.C. § 285 with respect to IPIX and, accordingly, Mr. Oxaal is entitled to an award of reasonable attorneys' fees as well as an award of treble damages pursuant to 35 U.S.C. § 284.

22. The conduct of IPIX has caused and threatened to cause irreparable harm to Mr. Oxaal for which he has no adequate remedy at law.

PRAYER FOR RELIEF

WHEREFORE, Mr. Oxaal prays for:

1. Judgment holding IPIX, Kodak, Nikon and Cendant jointly and severally liable for infringement of the '782 patent;

2. A permanent injunction enjoining IPIX, its subsidiaries, officers, agents, servants, employees and/or attorneys, and all other persons in active concert or participation with them, from further infringement of the '782 patent;

3. A permanent injunction enjoining Kodak, its subsidiaries, officers, agents, servants, employees and/or attorneys, and all other persons in active concert or participation with them, from further infringement of the '782 patent;

4. A permanent injunction enjoining Nikon, its subsidiaries, officers, agents, servants, employees and/or attorneys, and all other persons in active concert or participation with them, from further infringement of the '782 patent;

5. A permanent injunction enjoining Cendant, its subsidiaries, officers, agents, servants, employees and/or attorneys, and all other persons in active concert or participation with them, from further infringement of the '782 patent;

6. An accounting by IPIX, Kodak, Nikon and Cendant and the payment of damages plus interest caused by their acts of infringement, and an award of same to Mr. Oxaal, including an amount equal to three-fold of the damages owed by IPIX together with interest because its infringement is willful and deliberate;

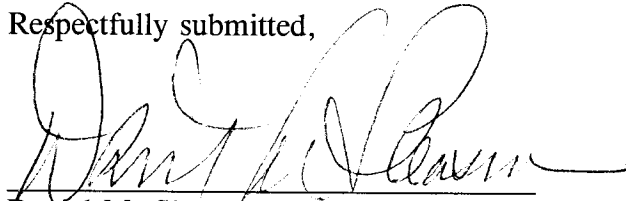
7. An award of Mr. Oxaal's costs and attorneys' fees in this action because this case is exceptional under 35 U.S.C. § 285; and

8. Such other, further and different relief as the Court deems just and proper.

DEMAND FOR JURY TRIAL

Plaintiff Ford Oxaal demands a trial by jury of all issues so triable.

Respectfully submitted,



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Michael L. Doane, No. Bar Code 105127 ✓
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Fifth Floor
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Fax: (202) 466-2006

Dated: May 20, 1999

Counsel for Ford Oxaal

EXHIBIT

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US005903782A

United States Patent [19]

Oxnal

[11] Patent Number: 5,903,782

[45] Date of Patent: May 11, 1999

[34] METHOD AND APPARATUS FOR
PRODUCING A THREE-HUNDRED AND
SIXTY DEGREE SPHERICAL VISUAL DATA
SET

[76] Inventor: Ford Oxnal, 212 3rd St., No. 3-D,
Troy, N.Y. 12180

[21] Appl. No.: 08/749,166

[22] Filed: Nov. 14, 1996

Related U.S. Application Data

[60] Provisional application No. 60/006,800, Nov. 15, 1995.

[51] Int. Cl.⁴ G03B 29/00

[52] U.S. Cl. 396/50; 396/428; 396/20

[58] Field of Search 396/50, 428, 20,
396/427

[56] References Cited

U.S. PATENT DOCUMENTS

1,730,346	10/1929	Beeson et al.	396/428
3,183,810	5/1965	Campbell et al.	396/20
4,591,250	5/1986	Woodruff	396/50
5,159,368	10/1992	Zemlin	396/427
5,185,667	2/1993	Zimmermann	
5,200,818	4/1993	Mois et al.	
5,259,584	11/1993	Walshwright	396/20
5,313,306	5/1994	Kubas et al.	
5,359,363	10/1994	Kubas et al.	

5,384,588 1/1995 Martin et al.

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Photosphere Omniview Document, Nov. 2, 1995, pp. 1-3.
Applis Quick Time VR Document, Nov. 28, 1995.

Frequently Asked Questions About Photospheres, Omni-
view Inc., <http://www.usit.net/bp/omniview/faq.htm>, pp. 1-3,
Nov. 2, 1995.

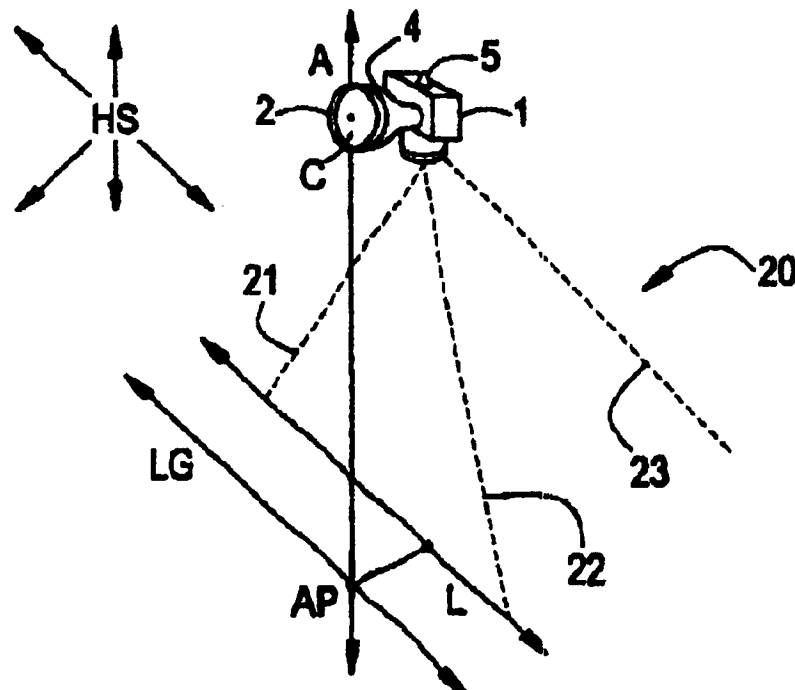
Primary Examiner—David M. Gray

Attorney, Agent, or Firm—Westerlund & Powell, P.C.;
Raymond H.J. Powell, Jr.; Robert A. Westerlund

[57] ABSTRACT

The present invention is directed to an apparatus and method for producing a three-hundred and sixty degree spherical visual data set using at least one lens. The lens encompasses a field of view of not less than one-hundred and eighty degrees. The field of view is represented by a hemisphere defined by a half-space which is, in turn, defined by a first plane having an origin point through which a vertical axis of the plane extends. The apparatus includes a mounting support member and a plumbing device. The mounting support member positions at least one camera having the at least one lens. The mounting support member is aligned with the vertical axis and rotatable in first and second directions through at least one-hundred and eighty degrees from a first position to a second position. The plumbing device is mounted to one of the camera, lens and mounting means and maintains the vertical axis plumb.

6 Claims, 4 Drawing Sheets



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U.S. Patent

May 11, 1999

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FIG. 1

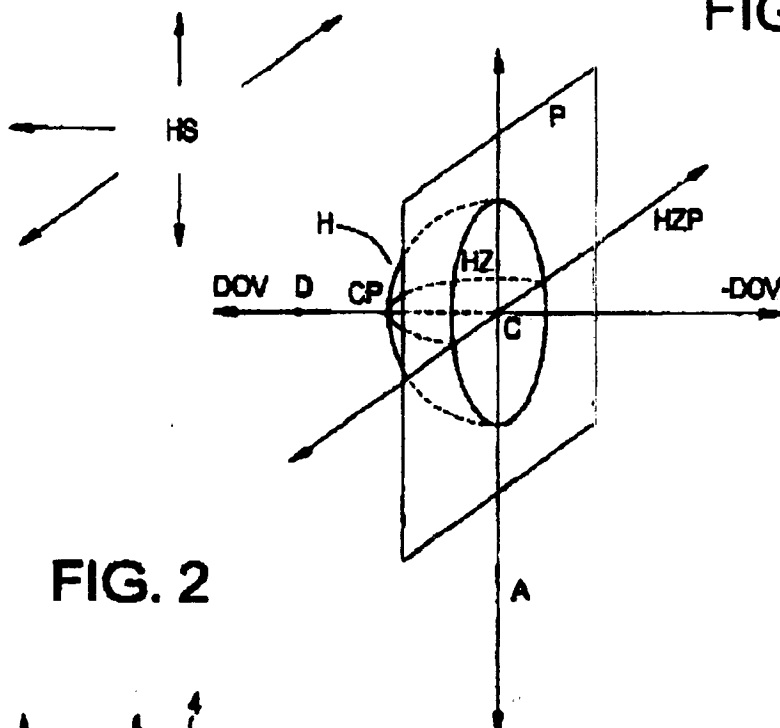


FIG. 2

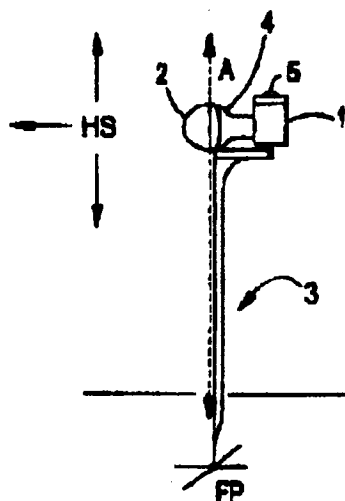
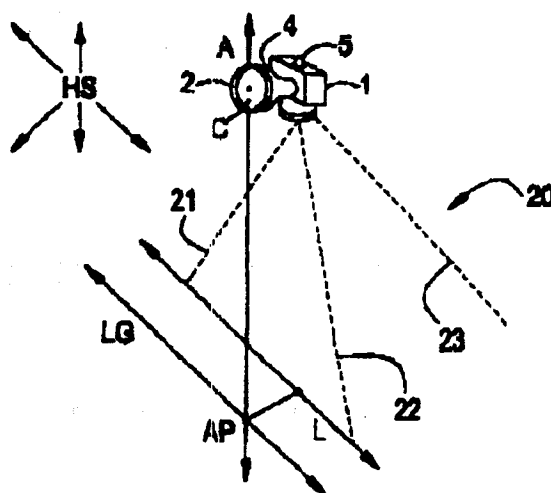


FIG. 3



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U.S. Patent

May 11, 1999

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FIG. 4A

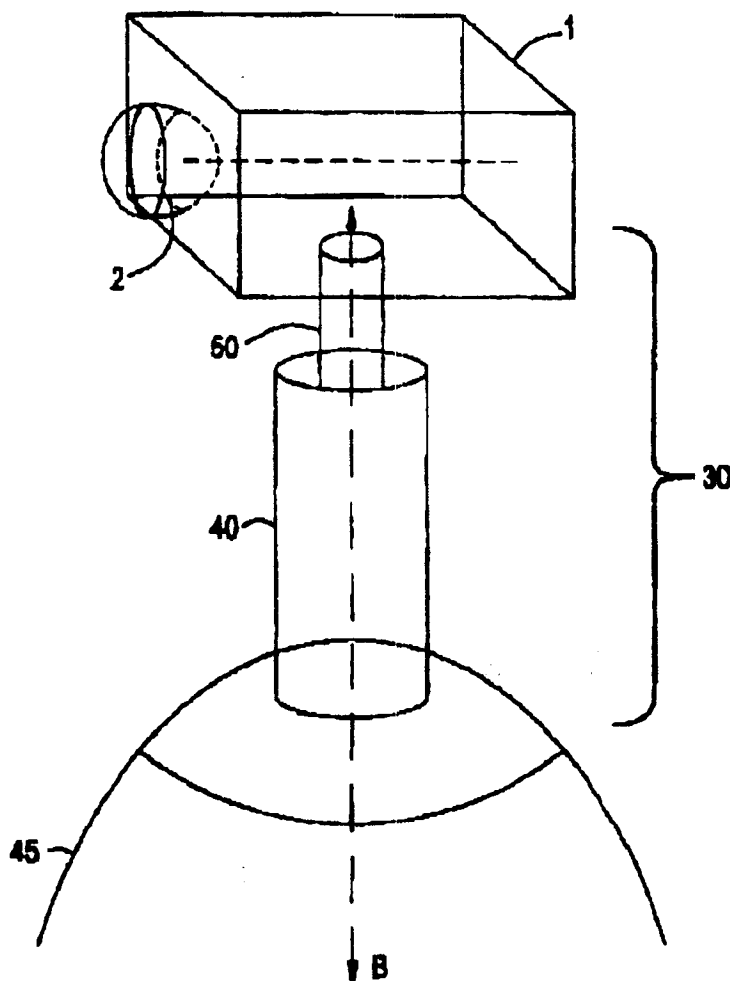
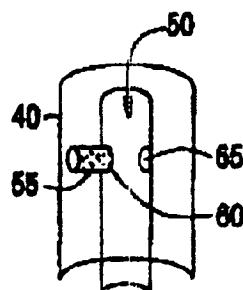


FIG. 4B



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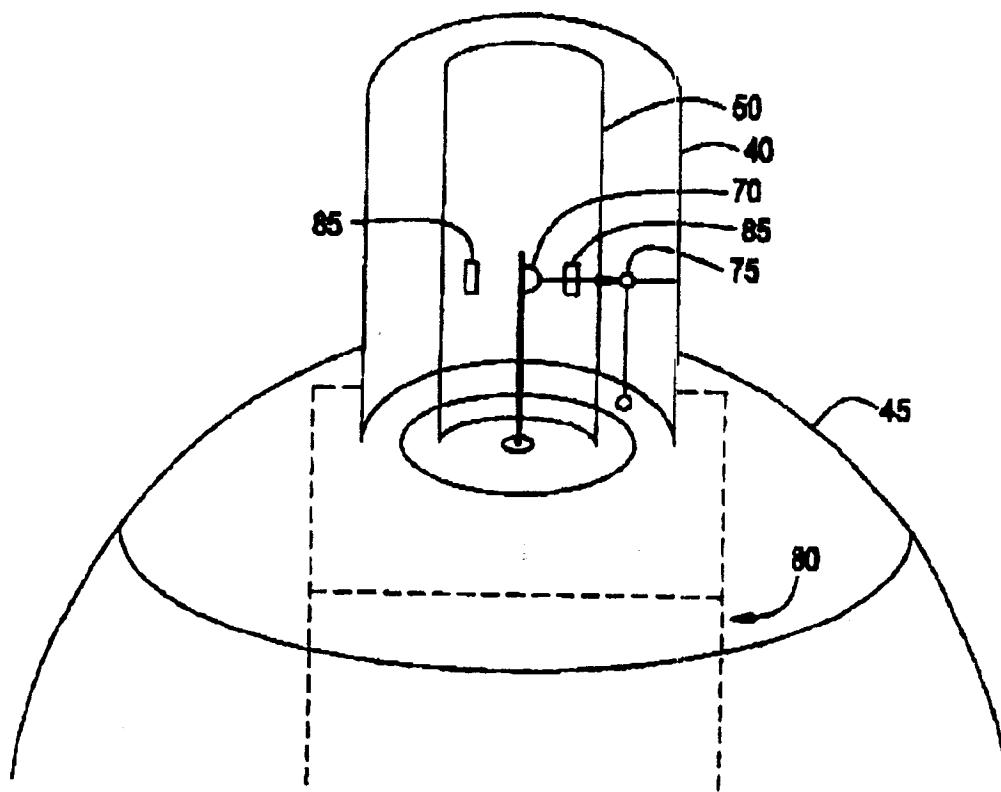
U.S. Patent

May 11, 1999

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FIG. 4C



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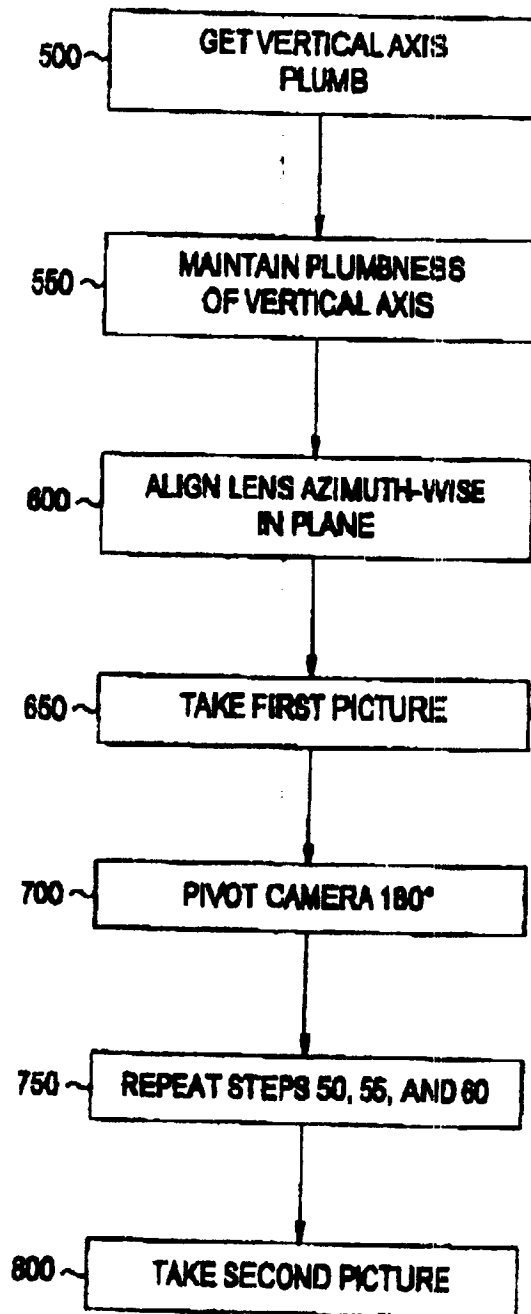
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FIG. 5



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METHOD AND APPARATUS FOR PRODUCING A THREE-HUNDRED AND SIXTY DEGREE SPHERICAL VISUAL DATA SET

This application claims benefit of use Provisional Appl.
No. 60/006,800 filed Nov. 15, 1995.

BACKGROUND OF THE INVENTION

1. Field of the Invention

The present invention relates generally to the field of photography. More specifically, the present invention is directed to an apparatus and method for producing a three-hundred and sixty degree spherical visual data set in order to facilitate the production of computer generated images.

2. Brief Discussion of the Related Art

In the field of photography, cameras are often fitted with a variety of wide angle lenses so that still photographs of panoramic views can be taken. In addition, digital image processing has made possible the creation of computer generated images of panoramic views from multiple digital images which are, in turn, derived from pictures taken using cameras fitted with conventional lenses.

Each computer generated image is created by digitally stitching the multiple digital images together using software. However, it is difficult to create a seamless computer image from digital images which are derived from analog-based pictures taken using conventional photography techniques. The reason stems from the fact that it is hard to properly align the camera which is used to take those pictures.

Early attempts at digital image processing have produced computer generated images of panoramic views which are cylindrical in nature. In other words, the computer images generated using conventional digital image processing techniques do not provide any views which are either above or below the camera that produced the original analog based pictures from which the digital images are derived.

With the advent of new digital image processing techniques, software has been developed which allows for the transformation of 360 degrees of visual input data in accordance with a particular perspective. The inventor of the present invention recognized a need for devices and methods of taking pictures which capture 360 degrees of spherical visual input data in order to take advantage of the newly developed digital image processing techniques which have been implemented in software. By way of example, one such software algorithm is described in U.S. application Ser. No. 08/478,839, filed on Jun. 7, 1995 by the inventor of the present invention.

SUMMARY OF THE INVENTION

In view of the foregoing, it is an object of the present invention to provide a method and apparatus for producing a three hundred and sixty degree spherical visual data set in order to provide the input for software algorithms which transform visual input data in accordance with a particular perspective.

According to one embodiment of the present invention, an apparatus is provided for producing a three-hundred and sixty degree spherical visual data set using at least one lens which encompasses a field of view of not less than one-hundred and eighty degrees, the field of view being represented by a hemisphere defined by a half-space which is, in turn, defined by a first plane having an origin point through which a vertical axis of the plane extends.

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The apparatus includes a mounting support member which positions at least one camera having the at least one lens, the mounting support member being aligned with the vertical axis and being rotatable in first and second directions through at least one-hundred and eighty degrees from a first position to a second position, and a plumbing device which is mounted to one of the camera, lens, and mounting support member and which maintains the vertical axis plumb with respect to a predetermined plane of reference. Preferably, the camera is positioned so that no part of the camera, other than the lens, is positioned within the half-space.

According to the present invention, the method of producing a three hundred and sixty degree spherical visual data set uses at least one lens of a camera which encompasses a field of view of not less than one-hundred and eighty degrees. The field of view is represented by a hemisphere defined by a half-space which is in turn defined by a first plane having an origin point through which a vertical axis of the first plane extends. The method comprises the steps of getting the vertical axis plumb with respect to a predetermined plane of reference and maintaining the plumbness of the vertical axis with respect to the predetermined plane of reference. The method also includes the steps of aligning the lens with the first plane and pivoting the lens one-hundred and eighty degrees around the vertical axis. Thereafter, the first four steps are repeated.

BRIEF DESCRIPTION OF THE DRAWINGS

These and other features, aspects and advantages of the present invention will become better understood with reference to the following description, appended claims and accompanying drawings, in which:

FIG. 1 depicts the field of interest within a field of view of a lens used in conjunction with a present embodiment of the invention.

FIG. 2 depicts one embodiment of the present invention which uses a monopod as a mounting support member for a camera having a lens.

FIG. 3 depicts another embodiment of the present invention which uses a tripod as a mounting support member for a camera having a lens.

FIGS. 4A-4C depict features of a mounting component which is employed in an embodiment of the present invention.

FIG. 5 depicts a flow chart which shows the steps of a method according to one aspect of the present invention.

DETAILED DESCRIPTION OF THE INVENTION

The present invention is directed to an apparatus and method for producing a three-hundred and sixty degree spherical visual data set using a camera fitted with a lens having a particular field of view.

FIG. 1 depicts a field of interest within a field of view of a lens used in an embodiment of the present invention. The field of interest is some designated 90 degree radius (180 degree) portion of the lens' field of view. This 180 degree portion may be represented as a hemisphere (H) defined by a half-space (HS), which is, in turn, defined by a plane (P). A center point (CP) is designated as the point on the hemisphere furthest from the plane (P).

The direction of vision (DOV) is a ray extending from a point (C) in the plane (P) through the center point (CP), point (C) also being the center of the hemisphere (H). Another ray

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(-DOV) extends from the point (C) in the opposite direction as the ray (DOV). A horizon (HZ) is a circle on the hemisphere (H) that intersects with the center point (CP). A vertical axis (A) is the line on the plane (P) which is perpendicular to an orthogonal projection (HIZP) of horizon (HZ) which is also in the vertical plane (P).

FIG. 2 depicts an exemplary apparatus for providing a three-hundred and sixty-degree spherical visual data set according to one embodiment of the present invention. The apparatus supports a camera (1) having a lens (2). The camera (1) is mounted on a monopod (3) which is aligned with the vertical axis (A). However, numerous other mounting support members may be employed, such as the tripod described in connection with FIG. 3 below.

The monopod (3) is placed on the ground at a foot point (FP) on the vertical axis (A). The foot point (FP) is a point in a predetermined plane of reference which may be the ground. Preferably, the camera (1) and its associated lens (2) are mounted on the monopod (3) such that neither the camera (1) nor the lens casing (4) are within the half-space (HS). Although a bubble level (5) is placed on the camera, one of ordinary skill will appreciate that the bubble level (5) may be mounted on the monopod (3) instead.

The bubble level (5) should be mounted so that when it is level, the vertical axis (A) will be plumb with respect to the predetermined plane of reference. The plumbness of the vertical axis (A) should be maintained with respect to the predetermined plane of reference and the lens (2) aligned azimuth-wise in the plane (P) described above in connection with FIG. 1. Preferably, a fixed light source is also aligned in the plane (P). A first picture is then taken. Subsequently, the apparatus is pivoted one-hundred and eighty degrees around the vertical axis while maintaining the foot point (FP) in the same position in preparation for the taking of an additional picture.

Another plumbing device may be employed in lieu of the bubble device. By way of example, the bubble level may be replaced with two tube levels which are positioned at right angles to one another.

If the camera and its associated lens are too heavy to put on a monopod, then a tripod can be employed as the mounting support member. A tripod is especially advantageous in time lapse photography or motion picture photography. An embodiment of the present invention employing a tripod is shown in FIG. 3. Elements depicted in FIG. 3 which are similar to those shown in FIG. 2 retain their same identifier. These elements include the camera (1), lens (2), lens casing (4), and bubble level (5).

The tripod (20) is adjusted so that its two front legs (21) and (22) form a plane roughly parallel to the vertical axis (A). The third leg (23) can be extended or retracted to achieve this objective. The line (L) connects the feet of the front legs (21) and (22) which are adjusted so that the line (L) is parallel to the plane (P). In this configuration, the tripod forms roughly a right-angled three-sided prism. Preferably, no part of the tripod is within the half-space (HS). Point (AP) where axis (A) intersects the ground is determined using a plumb line dropped from the point (C) to the ground. The point (AP) corresponds to the point (FP) depicted in FIG. 2.

Further refinements are possible with respect to the above-described embodiments of the present invention. Specifically, an apparatus according to the present invention may also include a mounting component (30), as shown in FIGS. 4A, 4B and 4C. Elements which are similar to those shown in FIG. 1 retain their same identifier. These elements

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include the camera (1) and the lens (2). The mounting component (30) includes an outer sleeve (40) which is detachably connected to the mounting support member (45). The mounting component (30) also includes an inner cylinder (50) which is detachably connected to the camera (1). The inner cylinder (50) rotates inside the outer sleeve (40) around axis (R) and clicks into place in a first direction (D) or a second opposite direction (-D) through the use of a spring-loaded pin (55) which is included in the outer sleeve (40), as shown in FIG. 4B.

The spring-loaded pin (55) forms a tight fit with either of two rounded notches (60 and 65) on opposite sides of the inner cylinder (50). The mounting component (30) can be adjusted so that the axis (A) of the field of interest of the lens (2) can be aligned with axis (R) when the camera (1) is attached to the mounting support member (45) via the mounting component (30).

As a further refinement, the mounting component (30) can be fitted with an LED (70) and optical sensor (75) instead of the spring-loaded pin (55), as shown in FIG. 4C. In this regard, the rotation of the inner cylinder (50) of the mounting component (30) can be electro-mechanically controlled via an electro-mechanical controller (80) in response to the detection of a light beam from the LED (70) or alternative light source by the optical sensor (75). The electro-mechanical controller (80) is positioned beneath the surface of the mounting support member (45) and is operatively connected to the inner cylinder (50) to control the rotation thereof. However, the electro-mechanical controller (80) need not be positioned beneath the surface of the mounting support member (45).

More specifically, the light beam, which is produced by the LED (70) disposed within the inner cylinder (50) of the mounting component (30), can be detected by the optical sensor (75), which is disposed on the outer sleeve (40) of the mounting component (30), through a slit (85) in the inner cylinder (50). However, those of ordinary skill in the art will appreciate that the LED (70) could be disposed on the outer sleeve (40) of the mounting component, while the optical sensor (75) is disposed within the inner cylinder (50) of the mounting component (30).

The camera (1) which is detachably connected to the inner cylinder (50) rotates in accordance with the rotation of the inner cylinder (50) so that the camera (1) can be made to take a picture in one direction (DOV) and then in an opposite direction (-DOV).

An additional refinement to the apparatus can be had by utilizing a mounting support member which is capable of supporting two cameras and two opposing lenses, the lenses being aligned so that point (CP) for each lens faces in opposite directions. However, parallax problems may result from the use of two cameras to the extent that each lens is prevented from being physically located so that the respective focal points of the lenses are identical. In this regard, the size of the cameras and the lens casings are important considerations because of the parallax problems which may arise from their combined use.

Advantageously, the apparatus can also be provided with a registering means for registering ray (DOV) or ray (-DOV). However, the registering means may register a predetermined reference ray other than ray (DOV) or ray (-DOV). By way of example, the registering means may be comprised of laser scopes, or a combination of laser reflection and photoelectric elements. Alternatively, the registering means may include a gyroscopic element.

The mounting support member can also include a gimbal mount which fits around a circular lens casing. However, the

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gimbal mount's axis should be made coincident with line (H2P) shown in FIG. 1 and the legs should be positioned so that they are coincident with plane (P), which is also shown in FIG. 1.

Advantageously, the mounting support member can be made of transparent and non-reflective materials in order to reduce the chance that the picture will be corrupted by the presence of the mounting support member in the resulting picture.

A method of producing a 360 degree spherical visual input data set is also provided in accordance with the present invention. The method is described with reference to the lens having the field of view shown in FIG. 1. However, the flow chart depicted in FIG. 3 identifies the steps of the method.

According to the present invention, the method includes the step 500 of getting the vertical axis (A) plumb with respect to a predetermined plane of reference which may be the ground. This step 500 can be accomplished using a plumbing device such as the bubble level described above or a conventional plumb line. The method also includes the step 550 of maintaining the plumbness of the vertical axis (A) with respect to the predetermined plane of reference and the step 600 of aligning the lens azimuth-wise in the plane (P). Preferably, a fixed light source is also aligned in plane (P) in order to provide adequate lighting for the taking of the picture.

In addition, the method also includes the step 650 of taking a first picture using the camera and the step 700 of pivoting the camera 180 degrees around the axis (A). By way of example, if a monopod is being used as the mounting support member for the camera and its associated lens, as shown in FIG. 2, the monopod is rotated 180 degrees while keeping the foot print (FP) the same.

However, if a tripod is used as the mounting support member instead of the monopod, as shown in FIG. 3, then a line (LG) is first delineated on the ground (or an alternate predetermined plane of reference) representing the intersection of plane (P) with the ground. The line (LG) also passes through the point (AP), as discussed above in connection with FIG. 3. The tripod is then adjusted so that its front two legs form feet on a line (L) which is roughly parallel to the line (LG).

The remaining leg is then adjusted until the plumbing device indicates that the vertical axis (A) is plumb. The first picture is then taken using the camera. Subsequently, the entire apparatus is rotated 180 degrees. The proper alignment of the apparatus is confirmed by determining whether the front two feet of the tripod again form a line which is parallel to the line (LG) and by determining whether point (C) forms a line which is plumb and which contains the point (AP).

Following the pivoting of the camera and its associated lens, steps 500, 550 and 600 are repeated in step 750. Finally, in step 800 a second picture is taken to complete the acquisition of three-hundred and sixty degrees of spherical visual data.

Although the preferred embodiments of the present invention have been described, the spirit and scope of the invention is by no means restricted to what is described above. For example, a digital camera may be employed avoiding the necessity of converting analog based pictures into digital format to facilitate the production of computer generated images using software algorithms which transforms three-hundred and sixty degree spherical visual input data in accordance with a particular perspective.

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What is claimed is:

1. A method for producing a three-hundred and sixty degree visual data set using at least one lens of a camera which encompasses a field of view of not less than one-hundred and eighty degrees, said field of view being represented by a hemisphere having a base which defines at least a half-space which is in turn defined by a first plane having an origin point through which a vertical axis of said first plane extends, said first plane coinciding with said base of said hemisphere and said origin point coinciding with a center of said hemisphere, said method comprising the steps of:

- (i) getting said vertical axis plumb with respect to a first predetermined plane of reference;
- (ii) maintaining the plumbness of said vertical axis with respect to the first predetermined plane of reference;
- (iii) aligning the lens such that said first plane corresponds to a second predetermined plane of interest;
- (iv) shooting a picture using said camera;
- (v) pivoting the lens substantially one-hundred and eighty degrees around the vertical axis; and
- (vi) repeating steps (i) through (iv).

2. The method as recited in claim 1, further comprising the step of aligning a fixed light source with said first plane after the step of aligning the lens.

3. The method as recited in claim 1, wherein a monopod is used to support the lens.

4. A method for producing a three-hundred and sixty degree visual data set using at least one lens of a camera which encompasses a field of view of not less than one-hundred and eighty degrees, said field of view being represented by a hemisphere having a base which defines at least a half-space which is in turn defined by a first plane having an origin point through which a vertical axis of said first plane extends, said first plane coinciding with said base of said hemisphere and said origin point coinciding with a center of said hemisphere, wherein a tripod is used to support the lens, said method comprising the steps of:

- (i) getting said vertical axis plumb with respect to a first predetermined plane of reference, wherein the step of getting said vertical axis plumb further comprises the steps of:
 - delineating a first line on the ground representing an intersection of said first plane with the ground;
 - placing a first leg and a second leg of said tripod on a second line parallel to said first line; and
 - adjusting a third leg of said tripod such that the vertical axis is plumb with said predetermined plane of reference;
- (ii) maintaining the plumbness of said vertical axis with respect to the first predetermined plane of reference;
- (iii) aligning the lens such that said first plane corresponds to a second predetermined plane of interest;
- (iv) shooting a picture using said camera;
- (v) pivoting the lens substantially one-hundred and eighty degrees around the vertical axis; and
- (vi) repeating steps (i) through (iv).

5. The method as recited in claim 4, wherein the step of pivoting the lens further comprises the step of: pivoting said tripod one-hundred and eighty degrees so that the first and second legs are placed on a third line parallel to said first line.

6. A method for producing a three-hundred and sixty degree visual data set using at least one lens of a camera supported by a tripod which encompasses a field of view of

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not less than one-hundred and eighty degrees, said field of view being represented by a hemisphere having a base which defines at least a half-space which is in turn defined by a first plane having an origin point through which a vertical axis of said first plane extends, said first plane coinciding with said base of said hemisphere and said origin point coinciding with a center of said hemisphere, said method comprising the steps of:

- (i) getting said vertical axis plumb with respect to a first predetermined plane of reference, said step (i) further comprising steps for:
 - defining a first line on the ground representing an intersection of said first plane with the ground;
 - placing a first leg and a second leg of said tripod on a second line parallel to said first line; and
 - adjusting a third leg of said tripod such that the vertical axis is plumb with said predetermined plane of reference;

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- (ii) maintaining the plumbness of said vertical axis with respect to the first predetermined plane of reference;
- (iii) aligning the lens such that said first plane corresponds to a second predetermined plane of interest;
- (iv) aligning a fixed light source with said first plane;
- (v) shooting a picture using said camera;
- (vi) pivoting the lens substantially one-hundred and eighty degrees around the vertical axis;
- (vii) pivoting said tripod one-hundred and eighty degrees so that the first and second legs are placed on a third line parallel to said first line; and
- (viii) repeating steps (i) through (iv), wherein:
 - said steps (iii) and (iv) are performed in the stated order, and
 - said steps (vi) and (vii) are performed in any order.

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